Bota of Boulder – Outback™ Water Filtration System

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Device Information

The Outback™ Water Filtration System is a handheld sports type squeeze bottle. The bottle is available in two sizes having a capacity of either 0.65 L (22 oz.) or 0.94 L (32 oz.). The bottle contains a filter cartridge that is assumed to consist of an activated carbon block depth filter that sits inside the top of the sports bottle between the bottle and the drink spout. The activated carbon filter is a 6 cm long hollow-core cylinder with a 0.8 cm thick wall. Water flows from outside through the filter wall into the hollow inside and out the drink spout. The filter is assumed to have an approximate 2 µm nominal pore size based on information from marketers of similar sports type squeeze bottles with carbon block depth filters. Information provided on the manufacturer's website claims this device removes 99.9% (3-log) *Cryptosporidium* oocysts and *Giardia* cysts based on results compiled by independent labs. Directions for use require the user to fill the bottle with water, insert the activated carbon filter, replace the cap and squeeze to produce water. For storage, the manufacturer recommends the filter be stored dry. Prior to the first use the filter must be flushed to remove filter particle fines.

Effectiveness Against Microbial Pathogens

No data was received showing the effectiveness of this product with respect to the USEPA Guide Standard Protocol for Testing Microbiological Water Purifiers (reference 1). The theory and practice of depth filtration has been widely studied and there has been significant research conducted on activated carbon block filtration (reference 2). In the absence of data specific to this device tested using reference 1, and based on general knowledge of depth filtration, this device should be capable of consistently reducing *Giardia* cysts and *Cryptosporidium* oocysts to the required minimum log reductions stated in reference 1 (i.e., 3-log) when used as directed. It is not expected to consistently reduce bacteria (6-log) and viruses (4-log). Based on general depth and carbon block filtration information, the Outback™ Water Filtration System is assigned one check for the reduction of *Giardia* cysts and *Cryptosporidium* oocysts and an X for bacteria and virus reduction (for an explanation of the rating checks click here).

™ Outback is a registered trademark of Bota of Boulder, Inc., Boulder, CO. Use of trademarked products does not imply endorsement by the U.S. Army, but is intended only in identification of a specific product.

Table. Expected Performance Against Microbial Pathogens.

Microbial Pathogen Type	Expected Disinfection Capability	Evaluation Rating	Primary Pathogen Reduction Mechanism
Bacteria	>6 log	X	-
Viruses	>4 log	X	-
Giardia cysts	>3 log	√	size exclusion
Cryptosporidium oocysts	>3 log	√	size exclusion

Production Rate and Capacity

Inherent to the production rate and capacity of filtration devices is the quality of the raw water source. Because it is a squeeze bottle, the actual production rate is dependent on the user. The production capacity is stated to be about 150 L. It is also recommended the filter be replaced every 6 months or as directed. Production capacity will vary widely with raw water quality (i.e., turbidity).

Cleaning, Replacement, and End of Life Indicator

This device cannot be backwashed to remove sediment from the filter. When the device becomes unusable due to decreased production rate, the clogged filter must be replaced. The bottle is dishwasher safe or can be hand washed. For practical purposes, the filter cartridges are not cleanable. The device contains no end of life indicator short of filter clogging.

Weight and Size

Dry weight	150 g.
Size (height x diameter)	24 cm x 7 cm

Cost

Bottle with filter	$20.00
Replacement filter	$ 9.00

Device Evaluation

No data was received that challenged the Outback™ Water Filtration System against reference 1. General research on depth and carbon block filtration indicates that this device should be capable of consistently reducing *Giardia* cysts and *Cryptosporidium* oocysts. This device is not likely capable of consistently reducing bacteria and viruses. Additional treatment is necessary to remove bacteria and viruses such as adding a disinfectant (e.g., chlorine, iodine, chlorine dioxide) to the bottle prior to filtering. The activated carbon should remove tastes and odors. This device, like all filters with small pore sizes, is highly affected by turbid (cloudy) waters. Since the device is not able to be backwashed to remove accumulated particulates, once clogged, the filter must be replaced. There is no indicator of process failure or end of device useful life.

Advantages

- Expected to consistently provide adequate protection from *Giardia* cysts and *Cryptosporidium* oocysts, although device-specific testing data using the USEPA protocol is not available.
- No wait time prior to consumption.
- Provides taste and odor reduction.

Disadvantages

- Not expected to be consistently effective against bacteria and viruses.
- Additional treatment required.
- Reduced production capacity when using high turbidity water.
- Not backwashable.
- No real-time indicator of process failure.

References

1. USEPA, 1989. Guide Standard and Protocol for Testing Microbiological Water Purifiers. *Federal Register*. 54:34067.

2. U.S. Army Center for Health Promotion and Preventive Medicine, 2005. *Technical Information Paper; Filtration in the Use of Individual Water Purification Devices,* Aberdeen Proving Ground, MD.